Robert Nazaryan and Hayk Nazaryan

Foundation Armenian Theory Of General Relativity In One Physical Dimension By Pictures

Yerevan - 2016

100 Years Inquisition In Science Is Now Over
Armenian Revolution In Science Has Begun!

2007

Crash Course in Armenian Theory of General Relativity

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Robert Nazaryan and Hayk Nazaryan

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Contents

If you have the strong urge to accuse somebody for what you read here,
Then don't accuse us, read the sentence to mathematics.
We are simply its messengers only.

Armenian Theory of General Relativity Is a New and Solid Mathematical Theory, Because it Satisfies the Conditions to be Called a New Theory

1) Our created theory is new, because it was created and developed between the years 2014 - 2016.
2) Our created new theory does not contradict former legacy theories of physics.
3) The former legacy theory of general relativity (kinematics) is a very special case of the Armenian Theory of General Relativity, when coefficient $s = 0$.
4) All formulas derived in this volume - such as Armenian relation formulas between reciprocal relative velocities, Armenian addition and subtraction formulas between velocities, Armenian gamma functions and relations between them, also infinitesimal Armenian interval formula and infinitesimal coordinates Armenian transformation equations has a universal character because those are the exact mathematical representation of the Nature (*Philosophiae naturalis principia mathematica*).

Chapter A

The Most General Transformations Between None Inertial Observing Systems When Time – Space Coordinates are None Homogenous and None Isotropic

The Most General Transformation Forms Of the Test Particle Coordinates

- *Time-space coordinates transformations between two reference systems*

A_01

Direct transformations

$$\begin{cases} t' = t'(t,x,v) \\ x' = x'(t,x,v) \end{cases}$$

and

Inverse transformations

$$\begin{cases} t = t(t',x',v') \\ x = x(t',x',v') \end{cases}$$

Where all t', x', t and x quantities are arbitrary functions.

- *Reference coordinate systems initial state conditions*

A_02

When $t = t' = t'' = \cdots = 0$

Then origins of all coordinate systems coincide each other on the one origin in 0 point

Conditions of Reciprocal Relative Velocities For Observing Coordinate Systems (Case B)

- *Direct and inverse relative velocities of the observing coordinate systems must be*

$$\begin{cases} \text{Direct relative velocity} & \Rightarrow & v & \neq & \text{constant} \\ \text{Inverse relative velocity} & \Rightarrow & v' & \neq & \text{constant} \end{cases}$$

A_03

- *Therefore differentials of direct and inverse relative velocities satisfy*

$$\begin{cases} dv & \neq & 0 \\ dv' & \neq & 0 \end{cases}$$

A_04

The Most General Transformation Equations For Observed Test Particle Coordinates Differentials

- *Direct transformation equations for test particle coordinates differentials*

A_05

$$\begin{cases} dt' = \dfrac{\partial t'}{\partial t}dt + \dfrac{\partial t'}{\partial x}dx + \dfrac{\partial t'}{\partial v}dv \\ dx' = \dfrac{\partial x'}{\partial t}dt + \dfrac{\partial x'}{\partial x}dx + \dfrac{\partial x'}{\partial v}dv \end{cases}$$

- *Inverse transformation equations for test particle coordinates differentials*

A_06

$$\begin{cases} dt = \dfrac{\partial t}{\partial t'}dt' + \dfrac{\partial t}{\partial x'}dx' + \dfrac{\partial t}{\partial v'}dv' \\ dx = \dfrac{\partial x}{\partial t'}dt' + \dfrac{\partial x}{\partial x'}dx' + \dfrac{\partial x}{\partial v'}dv' \end{cases}$$

Defining the Coefficients of the General Transformation Equations

- *In the case of direct transformations for test particle coordinates differentials*

Definition of beta coefficients

$$\begin{cases} \dfrac{\partial t'}{\partial t} = \beta_1(t,x,v) \\ \dfrac{\partial t'}{\partial x} = \beta_2(t,x,v) \\ \dfrac{\partial t'}{\partial v} = \beta_3(t,x,v) \end{cases}$$

and

Definition of gamma coefficients

$$\begin{cases} \dfrac{\partial x'}{\partial t} = \gamma_1(t,x,v) \\ \dfrac{\partial x'}{\partial x} = \gamma_2(t,x,v) \\ \dfrac{\partial x'}{\partial v} = \gamma_3(t,x,v) \end{cases}$$

A_07

- *In the case of inverse transformations for test particle coordinates differentials*

Definition of beta coefficients

$$\begin{cases} \dfrac{\partial t}{\partial t'} = \beta'_1(t',x',v') \\ \dfrac{\partial t}{\partial x'} = \beta'_2(t',x',v') \\ \dfrac{\partial t}{\partial v'} = \beta'_3(t',x',v') \end{cases}$$

and

Definition of gamma coefficients

$$\begin{cases} \dfrac{\partial x}{\partial t'} = \gamma'_1(t',x',v') \\ \dfrac{\partial x}{\partial x'} = \gamma'_2(t',x',v') \\ \dfrac{\partial x}{\partial v'} = \gamma'_3(t',x',v') \end{cases}$$

A_08

Direct and Inverse Transformation Equations For Test Particle Coordinates Differentials Becomes

- *Coordinates differentials direct transformations expressed by new coefficients*

A_09

$$\begin{cases} dt' = \beta_1(t,x,v)dt + \beta_2(t,x,v)dx + \beta_3(t,x,v)dv \\ dx' = \gamma_1(t,x,v)dt + \gamma_2(t,x,v)dx + \gamma_3(t,x,v)dv \end{cases}$$

- *Coordinates differentials inverse transformations expressed by new coefficients*

A_10

$$\begin{cases} dt = \beta'_1(t',x',v')dt' + \beta'_2(t',x',v')dx' + \beta'_3(t',x',v')dv' \\ dx = \gamma'_1(t',x',v')dt' + \gamma'_2(t',x',v')dx' + \gamma'_3(t',x',v')dv' \end{cases}$$

Measurements of the Beta and Gamma Coefficients

- *Measurements of the beta coefficients*

$$\begin{cases} \beta_1 & \Rightarrow & \text{don't have measurement} \\ \beta_2 & \Rightarrow & \text{have inverse measurement of velocity } \left(\frac{1}{c}\right) \\ \beta_3 & \Rightarrow & \text{have inverse measurement of acceleration } \left(\frac{1}{a}\right) \end{cases}$$

A_11

- *Measurements of the gamma coefficients*

$$\begin{cases} \gamma_1 & \Rightarrow & \text{have measurement of velocity } (c) \\ \gamma_2 & \Rightarrow & \text{don't have measurement} \\ \gamma_3 & \Rightarrow & \text{have measurement of time } (t) \end{cases}$$

A_12

Chapter B

Implementation of the Relativity Postulate

Theory of General Relativity Postulates

- *Theory of General Relativity Postulates*

1. All fundamental physical laws have the same mathematical functional forms in all systems.
2. There exists a universal constant velocity c, which has the same value in all systems.

B_01

- *Because of the relativity postulate (first postulate), corresponding coefficients of direct and inverse transformation equations must be the same mathematical functions*

Beta functions identity

$$\begin{cases} \beta'_1(\quad) \equiv \beta_1(\quad) \\ \beta'_2(\quad) \equiv \beta_2(\quad) \\ \beta'_3(\quad) \equiv \beta_3(\quad) \end{cases}$$

and

Gama functions identity

$$\begin{cases} \gamma'_1(\quad) \equiv \gamma_1(\quad) \\ \gamma'_2(\quad) \equiv \gamma_2(\quad) \\ \gamma'_3(\quad) \equiv \gamma_3(\quad) \end{cases}$$

B_02

Implementation of the First Postulate Into The Test Particle Coordinates Differentials Direct and Inverse Transformation Equations

- *Test particle coordinates differentials direct transformation equations*

B_03

$$\begin{cases} dt' = \beta_1(t,x,v)dt + \beta_2(t,x,v)dx + \beta_3(t,x,v)dv \\ dx' = \gamma_1(t,x,v)dt + \gamma_2(t,x,v)dx + \gamma_3(t,x,v)dv \end{cases}$$

- *Test particle coordinates differentials inverse transformation equations*

B_04

$$\begin{cases} dt = \beta_1(t',x',v')dt' + \beta_2(t',x',v')dx' + \beta_3(t',x',v')dv' \\ dx = \gamma_1(t',x',v')dt' + \gamma_2(t',x',v')dx' + \gamma_3(t',x',v')dv' \end{cases}$$

Notations for Velocities and Accelerations for Observing Systems and for Moving Test Particle

- *Notations for reciprocal relative accelerations of observing systems*

$$\begin{cases} \dfrac{dv}{dt} = a \\ \dfrac{dv'}{dt'} = a' \end{cases} \Rightarrow \begin{cases} dv = a\,dt \\ dv' = a'\,dt' \end{cases}$$

B_05

- *Notations for velocities and accelerations of moving test particle*

Test particle velocities

$$\begin{cases} \dfrac{dx}{dt} = u \\ \dfrac{dx'}{dt'} = u' \end{cases}$$

and

Test particle accelerations

$$\begin{cases} \dfrac{d^2x}{dt^2} = \dfrac{du}{dt} = b \\ \dfrac{d^2x'}{dt'^2} = \dfrac{du'}{dt'} = b' \end{cases}$$

B_06

Direct and Inverse Transformation Equations New Forms For Observed Test Particle Coordinates Differentials

- *Direct transformations equations for observed test particle coordinates differentials*

B_07

$$\begin{cases} dt' = [\beta_1(t,x,v) + \beta_3(t,x,v)a]dt + \beta_2(t,x,v)dx \\ dx' = [\gamma_1(t,x,v) + \gamma_3(t,x,v)a]dt + \gamma_2(t,x,v)dx \end{cases}$$

- *Inverse transformations equations for observed test particle coordinates differentials*

B_08

$$\begin{cases} dt = [\beta_1(t',x',v') + \beta_3(t',x',v')a']dt' + \beta_2(t',x',v')dx' \\ dx = [\gamma_1(t',x',v') + \gamma_3(t',x',v')a']dt' + \gamma_2(t',x',v')dx' \end{cases}$$

Making a New Shortcut Notations For Beta and Gamma Coefficients

- *For observed test particle from the coordinate system* K

For beta functions

$$\begin{cases} \beta_1 \equiv \beta_1(t,x,v) \\ \beta_2 \equiv \beta_2(t,x,v) \\ \beta_3 \equiv \beta_3(t,x,v) \end{cases}$$

and

For gamma functions

$$\begin{cases} \gamma_1 \equiv \gamma_1(t,x,v) \\ \gamma_2 \equiv \gamma_2(t,x,v) \\ \gamma_3 \equiv \gamma_3(t,x,v) \end{cases}$$

B_09

- *For observed test particle from the coordinate system* K'

For beta functions

$$\begin{cases} \beta'_1 \equiv \beta_1(t',x',v') \\ \beta'_2 \equiv \beta_2(t',x',v') \\ \beta'_3 \equiv \beta_3(t',x',v') \end{cases}$$

and

For gamma functions

$$\begin{cases} \gamma'_1 \equiv \gamma_1(t',x',v') \\ \gamma'_2 \equiv \gamma_2(t',x',v') \\ \gamma'_3 \equiv \gamma_3(t',x',v') \end{cases}$$

B_10

Coordinates Differentials Transformation Equations Expressed by New Shortcut Notations

- *Coordinates differentials direct transformations expressed by shortcut notations*

B_11

$$\begin{cases} dt' = (\beta_1 + \beta_3 a)dt + \beta_2 dx \\ dx' = (\gamma_1 + \gamma_3 a)dt + \gamma_2 dx \end{cases}$$

- *Coordinates differentials direct transformations expressed by shortcut notations*

B_12

$$\begin{cases} dt = (\beta_1' + \beta_3' a')dt' + \beta_2' dx' \\ dx = (\gamma_1' + \gamma_3' a')dt' + \gamma_2' dx' \end{cases}$$

Chapter C

Reciprocal Solution Methods for the Systems of Transformation Equations

Coordinates Differentials Transformation Equations In the Form Systems of Linear Equations

- *System of direct transformation equations for test particle coordinates differentials*

C_01

$$\begin{cases} (\beta_1 + \beta_3 a)dt + \beta_2 dx = dt' \\ (\gamma_1 + \gamma_3 a)dt + \gamma_2 dx = dx' \end{cases}$$

- *System of inverse transformation equations for test particle coordinates differentials*

C_02

$$\begin{cases} (\beta'_1 + \beta'_3 a')dt' + \beta'_2 dx' = dt \\ (\gamma'_1 + \gamma'_3 a')dt' + \gamma'_2 dx' = dx \end{cases}$$

Determinants of the Systems of Linear Transformation Equations

- *Notations for determinants of the systems of transformation equations*

$$
\begin{cases}
D \equiv D(t,x,v,a) = \begin{vmatrix} (\beta_1 + \beta_3 a) & \beta_2 \\ (\gamma_1 + \gamma_3 a) & \gamma_2 \end{vmatrix} \\
D' \equiv D(t',x',v',a') = \begin{vmatrix} (\beta'_1 + \beta'_3 a') & \beta'_2 \\ (\gamma'_1 + \gamma'_3 a') & \gamma'_2 \end{vmatrix}
\end{cases}
$$

C_03

- *The determinants formulas of the coordinate systems transformation equations*

$$
\begin{cases}
D = (\beta_1 + \beta_3 a)\gamma_2 - \beta_2(\gamma_1 + \gamma_3 a) \neq 0 \\
D' = (\beta'_1 + \beta'_3 a')\gamma'_2 - \beta'_2(\gamma'_1 + \gamma'_3 a') \neq 0
\end{cases}
$$

C_04

The Solutions of the Systems of Transformation Equations

- *For coordinates of the observing system K, we get solutions*

C_05

$$dt = \frac{1}{D}\begin{vmatrix} dt' & \beta_2 \\ dx' & \gamma_2 \end{vmatrix} \quad \text{and} \quad dx = \frac{1}{D}\begin{vmatrix} (\beta_1 + \beta_3 a) & dt' \\ (\gamma_1 + \gamma_3 a) & dx' \end{vmatrix}$$

- *For coordinates of the observing system K', we get solutions*

C_06

$$dt' = \frac{1}{D'}\begin{vmatrix} dt & \beta_2' \\ dx & \gamma_2' \end{vmatrix} \quad \text{and} \quad dx' = \frac{1}{D'}\begin{vmatrix} (\beta_1' + \beta_3' a') & dt \\ (\gamma_1' + \gamma_3' a') & dx \end{vmatrix}$$

Two Forms of the Direct and Inverse Transformation Equations For Observed Test Particle Coordinates Differentials

- *New received forms of the direct and inverse transformation equations*

New received direct transformation equations

$$\begin{cases} dt' = \dfrac{\gamma'_2}{D'}dt - \dfrac{\beta'_2}{D'}dx \\ dx' = \dfrac{\beta'_1 + \beta'_3 a'}{D'}dx - \dfrac{\gamma'_1 + \gamma'_3 a'}{D'}dt \end{cases}$$

and

New received inverse transformation equations

$$\begin{cases} dt = \dfrac{\gamma_2}{D}dt' - \dfrac{\beta_2}{D}dx' \\ dx = \dfrac{\beta_1 + \beta_3 a}{D}dx' - \dfrac{\gamma_1 + \gamma_3 a}{D}dt' \end{cases}$$

C_07

- *The original forms of the direct and inverse transformation equations*

Original direct transformation equations

$$\begin{cases} dt' = (\beta_1 + \beta_3 a)dt + \beta_2 dx \\ dx' = (\gamma_1 + \gamma_3 a)dt + \gamma_2 dx \end{cases}$$

and

Original inverse transformation equations

$$\begin{cases} dt = (\beta'_1 + \beta'_3 a')dt' + \beta'_2 dx' \\ dx = (\gamma'_1 + \gamma'_3 a')dt' + \gamma'_2 dx' \end{cases}$$

C_08

Comparison of the New and Original Direct Transformation Equations

- *New received form of the direct transformation equations*

C_09

$$\begin{cases} dt' = \dfrac{\gamma_2'}{D'}dt - \dfrac{\beta_2'}{D'}dx \\ dx' = \dfrac{\beta_1' + \beta_3' a'}{D'}dx - \dfrac{\gamma_1' + \gamma_3' a'}{D'}dt \end{cases}$$

- *Original form of the direct transformation equations*

C_10

$$\begin{cases} dt' = (\beta_1 + \beta_3 a)dt + \beta_2 dx \\ dx' = (\gamma_1 + \gamma_3 a)dt + \gamma_2 dx \end{cases}$$

Comparison of the New and Original Inverse Transformation Equations

- *New received form of the inverse transformation equations*

$$\begin{cases} dt = \dfrac{\gamma_2}{D} dt' - \dfrac{\beta_2}{D} dx' \\ dx = \dfrac{\beta_1 + \beta_3 a}{D} dx' - \dfrac{\gamma_1 + \gamma_3 a}{D} dt' \end{cases}$$

C_11

- *Original form of the inverse transformation equations*

$$\begin{cases} dt = (\beta_1' + \beta_3' a')dt' + \beta_2' dx' \\ dx = (\gamma_1' + \gamma_3' a')dt' + \gamma_2' dx' \end{cases}$$

C_12

Relations Between Direct and Inverse Transformation Coefficients

- *From comparison of the direct transformation equations, we get the relations*

C_13

$$\begin{cases} \beta_1 + \beta_3 a = +\dfrac{\gamma_2'}{D'} \\ \beta_2 = -\dfrac{\beta_2'}{D'} \end{cases} \quad \text{and} \quad \begin{cases} \gamma_2 = +\dfrac{\beta_1' + \beta_3' a'}{D'} \\ \gamma_1 + \gamma_3 a = -\dfrac{\gamma_1' + \gamma_3' a'}{D'} \end{cases}$$

- *From comparison of the inverse transformation equations, we get the relations*

C_14

$$\begin{cases} \beta_1' + \beta_3' a' = +\dfrac{\gamma_2}{D} \\ \beta_2' = -\dfrac{\beta_2}{D} \end{cases} \quad \text{and} \quad \begin{cases} \gamma_2' = +\dfrac{\beta_1 + \beta_3 a}{D} \\ \gamma_1' + \gamma_3' a' = -\dfrac{\gamma_1 + \gamma_3 a}{D} \end{cases}$$

Grouping of the Important Relations

- *Two important relations*

$$\begin{cases} DD' = 1 \\ (\beta_1 + \beta_3 a)(\beta'_1 + \beta'_3 a') = \gamma_2 \gamma'_2 \end{cases}$$

C_15

- *First invariant relation, which we denote as* ζ_1

$$\frac{\beta_2}{\gamma_1 + \gamma_3 a} = \frac{\beta'_2}{\gamma'_1 + \gamma'_3 a'} = \zeta_1$$

C_16

- *Second invariant relation, which we denote as* ζ_2

$$\frac{\gamma_2 - (\beta_1 + \beta_3 a)}{\gamma_1 + \gamma_3 a} = \frac{\gamma'_2 - (\beta'_1 + \beta'_3 a')}{\gamma'_1 + \gamma'_3 a'} = \zeta_2$$

C_17

Chapter D

Definition of the Coefficient g

Examining First Invariant Relation

- *Coefficient ζ_1 must have the following functional arguments*

$$\begin{cases} \dfrac{\beta_2}{\gamma_1 + \gamma_3 a} = \dfrac{\beta_2(t,x,v)}{\gamma_1(t,x,v) + \gamma_3(t,x,v)a} = \zeta_1(t,x,v,a) \\ \dfrac{\beta_2'}{\gamma_1' + \gamma_3' a'} = \dfrac{\beta_2(t',x',v')}{\gamma_1(t',x',v') + \gamma_3(t',x',v')a'} = \zeta_1(t',x',v',a') \end{cases}$$

D_01

- *Therefore, the coefficient ζ_1 must satisfy the following functional equation*

$$\boxed{\zeta_1(t,x,v,a) = \zeta_1(t',x',v',a')}$$

D_02

Finding the Most General Solution for Functional Equation

- *For most general solution* ζ_1 *function must be a constant quantity*

D_03

$$\zeta_1(t,x,v,a) \;=\; \zeta_1(t',x',v',a') \;=\; \zeta_1 \;=\; \text{constant}$$

- *Therefore, beta and gamma coefficients relations must be constant*

D_04

$$\frac{\beta_2}{\gamma_1+\gamma_3 a} \;=\; \frac{\beta'_2}{\gamma'_1+\gamma'_3 a'} \;=\; \zeta_1 \;=\; \text{constant}$$

Definition of the Coefficient g

- *From the measurements of the beta and gamma coefficients, we can define* g

$$\zeta_1 = -g\frac{1}{c^2} = \text{constant}$$

D_05

- *Therefore the beta coefficients we can represent by the new coefficient* g

$$\begin{cases} \beta_2 = -g\frac{1}{c^2}(\gamma_1 + \gamma_3 a) \\ \beta_2' = -g\frac{1}{c^2}(\gamma_1' + \gamma_3' a') \end{cases}$$

D_06

Different Formulas for the Discriminants
For the System of Coordinates Differentials Transformations

- *System of the transformation equations discriminant formulas (first form)*

D_07

$$\begin{cases} D = (\beta_1 + \beta_3 a)\gamma_2 + g\frac{1}{c^2}(\gamma_1 + \gamma_3 a)^2 \neq 0 \\ D' = (\beta'_1 + \beta'_3 a')\gamma'_2 + g\frac{1}{c^2}(\gamma'_1 + \gamma'_3 a')^2 \neq 0 \end{cases}$$

- *System of the transformation equations discriminant formulas (second form)*

D_08

$$\begin{cases} D = \beta_1\gamma_2 + g\frac{1}{c^2}\gamma_1^2 + \left(\beta_3\gamma_2 + 2g\frac{1}{c^2}\gamma_1\gamma_3\right)a + g\frac{1}{c^2}\gamma_3^2 a^2 \neq 0 \\ D' = \beta'_1\gamma'_2 + g\frac{1}{c^2}\gamma_1'^2 + \left(\beta'_3\gamma'_2 + 2g\frac{1}{c^2}\gamma'_1\gamma'_3\right)a + g\frac{1}{c^2}\gamma_3'^2 a'^2 \neq 0 \end{cases}$$

Test Particle Time – Space Coordinates Differentials Direct and Inverse Transformation Equations

- *Test particle coordinates differentials direct transformation equations*

$$\begin{cases} dt' = (\beta_1 + \beta_3 a)dt - g\frac{1}{c^2}(\gamma_1 + \gamma_3 a)dx \\ dx' = (\gamma_1 + \gamma_3 a)dt + \gamma_2 dx \end{cases}$$

D_09

- *Test particle coordinates differentials inverse transformation equations*

$$\begin{cases} dt = (\beta'_1 + \beta'_3 a')dt' - g\frac{1}{c^2}(\gamma'_1 + \gamma'_3 a')dx' \\ dx = (\gamma'_1 + \gamma'_3 a')dt' + \gamma'_2 dx' \end{cases}$$

D_10

Chapter E

Reciprocal Examination of the Particles Movement Located in the Origins of the Observing Systems

Making Two Abstract – Theoretical Experiments When Particle Located in Origins of the Observing Systems

- *Above mentioned two abstract - theoretical experiments conditions*

In the origin of K' and In the origin of K

$$\begin{cases} u' = 0 \\ u = v \end{cases} \quad \text{and} \quad \begin{cases} u = 0 \\ u' = v' \end{cases}$$

E_01

- *Which is equivalent the following conditions*

In the origin of K' and In the origin of K

$$\begin{cases} dx' = 0 \\ dx = vdt \end{cases} \quad \text{and} \quad \begin{cases} dx = 0 \\ dx' = v'dt' \end{cases}$$

E_02

We need to Implement the Mentioned Conditions Into the Coordinates Differentials Transformation Equations

- *We need to use conditions (E_02) into the direct transformation equations*

E_03

$$\begin{cases} dt' = (\beta_1 + \beta_3 a)dt - g\frac{1}{c^2}(\gamma_1 + \gamma_3 a)dx \\ dx' = (\gamma_1 + \gamma_3 a)dt + \gamma_2 dx \end{cases}$$

- *We need to use conditions (E_02) into the inverse transformation equations*

E_04

$$\begin{cases} dt = (\beta_1' + \beta_3' a')dt' - g\frac{1}{c^2}(\gamma_1' + \gamma_3' a')dx' \\ dx = (\gamma_1' + \gamma_3' a')dt' + \gamma_2' dx' \end{cases}$$

Examining the First Abstract – Theoretical Experiment

- *The condition of the first abstract - theoretical experiment*

$$\begin{cases} dx' = 0 \\ dx = vdt \end{cases} \qquad \text{E\_05}$$

- *Above condition used on transformation equations (E_03) and (E_04)*

From direct transformation equations

$$\begin{cases} dt' = \left[(\beta_1 + \beta_3 a) - g\frac{v}{c^2}(\gamma_1 + \gamma_3 a)\right]dt \\ 0 = (\gamma_1 + \gamma_2 v + \gamma_3 a)dt \end{cases}$$

and

From inverse transformation equations

$$\begin{cases} dt = (\beta_1' + \beta_3' a')dt' \\ vdt = (\gamma_1' + \gamma_3' a')dt' \end{cases} \qquad \text{E\_06}$$

Important Results of the First Experiment

- *The first abstract - theoretical experiment's important relations*

E_07

$$\begin{cases} \gamma_1 + \gamma_3 a = -\gamma_2 v \\ v = \dfrac{\gamma'_1 + \gamma'_3 a'}{\beta'_1 + \beta'_3 a'} \end{cases}$$

- *Beta coefficients relation from the first abstract - theoretical experiment*

E_08

$$\beta'_1 + \beta'_3 a' = \frac{1}{\beta_1 + \beta_3 a - g\frac{v}{c^2}(\gamma_1 + \gamma_3 a)}$$

Examining the Second Abstract – Theoretical Experiment

- *The condition of the second abstract - theoretical experiment*

$$\begin{cases} dx = 0 \\ dx' = v'dt' \end{cases} \qquad \text{E\_09}$$

- *Above condition used on transformation equations (E_03) and (E_04)*

From direct transformation equations

$$\begin{cases} dt' = (\beta_1 + \beta_3 a)dt \\ v'dt' = (\gamma_1 + \gamma_3 a)dt \end{cases}$$

and

From inverse transformation equations

$$\begin{cases} dt = \left[(\beta_1' + \beta_3' a') - g\frac{v'}{c^2}(\gamma_1' + \gamma_3' a')\right]dt' \\ 0 = (\gamma_1' + \gamma_2' v' + \gamma_3' a')dt' \end{cases} \qquad \text{E\_10}$$

Important Results of the Second Experiment

- *The second abstract - theoretical experiment's important relations*

E_11

$$\begin{cases} \gamma_1' + \gamma_3' a' = -\gamma_2' v' \\ v' = \dfrac{\gamma_1 + \gamma_3 a}{\beta_1 + \beta_3 a} \end{cases}$$

- *Beta coefficients relations from the second abstract - theoretical experiment*

E_12

$$\beta_1 + \beta_3 a = \frac{1}{\beta_1' + \beta_3' a' - g\frac{v'}{c^2}(\gamma_1' + \gamma_3' a')}$$

For Simplicity Purposes We Make the Following New Abbreviations

- *First group of abbreviations, which don't have measurements*

$$\begin{cases} \beta_1 + \beta_3 a = \beta_1(t,x,v) + \beta_3(t,x,v)a = \beta(t,x,v,a) \equiv \beta \\ \beta_1' + \beta_3' a' = \beta_1(t',x',v') + \beta_3(t',x',v')a' = \beta(t',x',v',a') \equiv \beta' \end{cases}$$

E_13

- *Second group of abbreviations, which also don't have measurements*

$$\begin{cases} \gamma_2 = \gamma_2(t,x,v) = \gamma(t,x,v) \equiv \gamma \\ \gamma_2' = \gamma_2(t',x',v') = \gamma(t',x',v') \equiv \gamma' \end{cases}$$

E_14

Two Experiments Results Written Together

- *First group of coefficients relations with abbreviations*

E_15

$$\begin{cases} \gamma_1 + \gamma_3 a = -\gamma v \\ \gamma'_1 + \gamma'_3 a' = -\gamma' v' \end{cases} \Rightarrow \begin{cases} \beta_2 = g\dfrac{v}{c^2}\gamma \\ \beta'_2 = g\dfrac{v'}{c^2}\gamma' \end{cases}$$

- *Second group of coefficients relations with abbreviations*

E_16

$$\begin{cases} \beta = \dfrac{1}{\beta' + g\dfrac{v'^2}{c^2}\gamma'} \\ \beta' = \dfrac{1}{\beta + g\dfrac{v^2}{c^2}\gamma} \end{cases}$$

Relations Between Relative Velocities

- *Relations between inverse and direct relative velocities*

$$\begin{cases} v' = \dfrac{\gamma_1 + \gamma_3 a}{\beta_1 + \beta_3 a} \\ v = \dfrac{\gamma'_1 + \gamma'_3 a'}{\beta'_1 + \beta'_3 a'} \end{cases} \Rightarrow \begin{cases} v' = -\dfrac{\gamma}{\beta} v \\ v = -\dfrac{\gamma'}{\beta'} v' \end{cases}$$

E_17

- *Relative velocity satisfies the involution (self-inverse) property*

$$(v')' = -\frac{\gamma'}{\beta'} v' = v \quad \Rightarrow \quad (v')' \equiv v$$

E_18

Relations Between Beta and Gamma Coefficients

- *First relations with abbreviations*

E_19

$$\begin{cases} \beta' = \dfrac{1}{\beta + g\dfrac{v^2}{c^2}\gamma} = \dfrac{1}{\beta\left(1 - g\dfrac{vv'}{c^2}\right)} \\ \beta = \dfrac{1}{\beta' + g\dfrac{v'^2}{c^2}\gamma'} = \dfrac{1}{\beta'\left(1 - g\dfrac{vv'}{c^2}\right)} \end{cases}$$

- *Second relation with abbreviations*

E_20

$$\gamma\gamma' = \beta\beta' = \frac{\beta}{\beta + g\dfrac{v^2}{c^2}\gamma} = \frac{\beta'}{\beta' + g\dfrac{v'^2}{c^2}\gamma'} = \frac{1}{1 - g\dfrac{vv'}{c^2}}$$

Transformations Discriminants Formulas

- *First group of discriminants formulas with abbreviations*

$$\begin{cases} D = \gamma\left(\beta + g\dfrac{v^2}{c^2}\gamma\right) \neq 0 \\ D' = \gamma'\left(\beta' + g\dfrac{v'^2}{c^2}\gamma'\right) \neq 0 \end{cases}$$

E_21

- *Second group of discriminants formulas with abbreviations*

$$\begin{cases} D = \beta\gamma\left(1 - g\dfrac{vv'}{c^2}\right) \neq 0 \\ D' = \beta'\gamma'\left(1 - g\dfrac{vv'}{c^2}\right) \neq 0 \end{cases} \Rightarrow DD' = 1$$

E_22

Test Particle Time – Space Coordinates Differentials Direct and Inverse Transformation Equations With Abbreviations

- *Direct transformation equations with abbreviations*

E_23

$$\begin{cases} dt' = \beta dt + g\dfrac{v}{c^2}\gamma dx \\ dx' = \gamma(dx - vdt) \end{cases}$$

- *Inverse transformation equations with abbreviations*

E_24

$$\begin{cases} dt = \beta' dt' + g\dfrac{v'}{c^2}\gamma' dx' \\ dx = \gamma'(dx' - v'dt') \end{cases}$$

Test Particle Time – Space Coordinates Differentials Direct and Inverse Transformation Equations With Arguments

- *Direct transformation equations written with full functions*

$$\begin{cases} dt' = \beta(t,x,v,a)dt + g\dfrac{v}{c^2}\gamma(t,x,v)dx \\ dx' = \gamma(t,x,v)(dx - vdt) \end{cases}$$

E_25

- *Inverse transformation equations written with full functions*

$$\begin{cases} dt = \beta(t',x',v',a')dt' + g\dfrac{v'}{c^2}\gamma(t',x',v')dx' \\ dx = \gamma(t',x',v')(dx' - v'dt') \end{cases}$$

E_26

Chapter F

Definition of the Coefficient S

Examining Second Invariant Relation

- *Second invariant relation given by (C_17) in brief form*

$$\boxed{\frac{\beta-\gamma}{\gamma v} = \frac{\beta'-\gamma'}{\gamma' v'} = \zeta_2}$$

F_01

- *Second invariant relation given by (C_17) in full functional dependence form*

$$\begin{cases} \dfrac{\beta-\gamma}{\gamma v} = \dfrac{\beta(t,x,v,a)-\gamma(t,x,v)}{\gamma(t,x,v)v} = \zeta_2(t,x,v,a) \\ \dfrac{\beta'-\gamma'}{\gamma' v'} = \dfrac{\beta(t',x',v',a')-\gamma(t',x',v')}{\gamma(t',x',v')v'} = \zeta_2(t',x',v',a') \end{cases}$$

F_02

Finding the Most General Solution for Functional Equation

- *The most general solution of the functional equation is when* ζ_2 *becomes a constant*

F_03

$$\boxed{\zeta_2(t,x,v,a) = \zeta_2(t',x',v',a') = \zeta_2 = \text{constant}}$$

- *From the measurements of beta and gamma we can define a new coefficient* *s*

F_04

$$\boxed{\zeta_2 = s\frac{1}{c} = \text{constant}}$$

Second Invariant Relation Expressed by New Coefficient

- *Invariant relation given (F_01) we can express by the new defined coefficient* s

$$\frac{\beta-\gamma}{\gamma v} = \frac{\beta'-\gamma'}{\gamma' v'} = s\frac{1}{c}$$

F_05

- *Formulas for beta coefficients expressed by the new defined coefficient* s

$$\begin{cases} \beta = \gamma\left(1+s\frac{v}{c}\right) \\ \beta' = \gamma'\left(1+s\frac{v'}{c}\right) \end{cases}$$

F_06

Armenian Formulas Between Relative Velocities

From this point on, our new derived transformation equations and all other important relativistic formulas, as in previous volume A, we also will name "Armenian". This is the best way to distinguish between the legacy and the new theories of relativity and their corresponding relativistic formulas.
Also, this research is the accumulation of practically 50 years of obsessive thinking about the natural laws of the Universe and recording those activities. This scientific research was done in Armenia by an Armenian and the original manuscripts were written in Armenian. This research is purely from the mind of an Armenian and from the holly land of Armenia, therefore we have full moral rights to call it by its rightful name - Armenian.

- *Armenian relation formulas between inverse and direct relative velocities*

F_07

$$\begin{cases} v' = -\dfrac{v}{1+s\dfrac{v}{c}} \\[2ex] v = -\dfrac{v'}{1+s\dfrac{v'}{c}} \end{cases} \Rightarrow \left(1+s\frac{v}{c}\right)\left(1+s\frac{v'}{c}\right) = 1$$

Armenian Direct and Inverse Transformation Equations For Test Particle Time – Space Coordinates Differentials

- *Armenian direct transformation equations of the test particle coordinates differentials*

$$\begin{cases} dt' = \gamma\left[\left(1 + s\frac{v}{c}\right)dt + g\frac{v}{c^2}dx\right] \\ dx' = \gamma(dx - vdt) \end{cases}$$

F_08

- *Armenian inverse transformation equations of the test particle coordinates differentials*

$$\begin{cases} dt = \gamma'\left[\left(1 + s\frac{v'}{c}\right)dt' + g\frac{v'}{c^2}dx'\right] \\ dx = \gamma'(dx' - v'dt') \end{cases}$$

F_09

Armenian Direct and Inverse Transformation Equations Written With Full Functional Dependency

- *Armenian direct transformation equations of the test particle coordinates differentials*

F_10

$$\begin{cases} dt' = \gamma(t,x,v)\left[\left(1+s\frac{v}{c}\right)dt + g\frac{v}{c^2}dx\right] \\ dx' = \gamma(t,x,v)(dx - vdt) \end{cases}$$

- *Armenian inverse transformation equations of the test particle coordinates differentials*

F_11

$$\begin{cases} dt = \gamma(t',x',v')\left[\left(1+s\frac{v'}{c}\right)dt' + g\frac{v'}{c^2}dx'\right] \\ dx = \gamma(t',x',v')(dx' - v'dt') \end{cases}$$

Chapter G

Derivation of the Armenian Gamma Functions

Armenian Invariant Interval Between Two Infinitesimal Events

- *Armenian transformation equations in the same measurement coordinates*

G_01

Armenian direct transformation equations

$$\begin{cases} cdt' = \gamma\left[\left(1 + s\frac{v}{c}\right)cdt + g\frac{v}{c}dx\right] \\ dx' = \gamma\left(dx - \frac{v}{c}cdt\right) \end{cases}$$

and

Armenian inverse transformation equations

$$\begin{cases} cdt = \gamma'\left[\left(1 + s\frac{v'}{c}\right)cdt' + g\frac{v'}{c}dx'\right] \\ dx = \gamma'\left(dx' - \frac{v'}{c}cdt'\right) \end{cases}$$

- *Quadratic form of the Armenian infinitesimal invariant interval*

G_02

$$d\text{Ե}^2 = (cdt)^2 + s(cdt)(dx) + g(dx)^2 = (cdt')^2 + s(cdt')(dx') + g(dx')^2$$

Making Reciprocal Calculations of the Armenian Interval

- *Reciprocal substitutions coordinates differentials into Armenian interval formulas (G_02)*

$$\begin{cases} d\text{б}^2 = \gamma^2\left(1 + s\frac{v}{c} + g\frac{v^2}{c^2}\right)[(cdt)^2 + s(cdt)(dx) + g(dx)^2] \\ d\text{б}^2 = \gamma'^2\left(1 + s\frac{v'}{c} + g\frac{v'^2}{c^2}\right)[(cdt')^2 + s(cdt')(dx') + g(dx')^2] \end{cases}$$

G_03

- *Above Armenian interval expressions must be equal the following original interval formulas*

$$\begin{cases} d\text{б}^2 = (cdt)^2 + s(cdt)(dx) + g(dx)^2 \\ d\text{б}^2 = (cdt')^2 + s(cdt')(dx') + g(dx')^2 \end{cases}$$

G_04

Equating Two Different Form of Interval Expressions We Obtain Armenian Gamma Function Formulas, Which are Depending Only on Relative Velocities

- *Gamma function of the Armenian direct transformation*

G_05

$$\boxed{\gamma = \gamma_{\text{չ}}(v) = \frac{1}{\sqrt{1 + s\frac{v}{c} + g\frac{v^2}{c^2}}}}$$

- *Gamma function of the Armenian inverse transformation*

G_06

$$\boxed{\gamma' = \gamma_{\text{չ}}(v') = \frac{1}{\sqrt{1 + s\frac{v'}{c} + g\frac{v'^2}{c^2}}}}$$

Armenian Direct and Inverse Transformation Equations For Test Particle Time – Space Coordinates Differentials

- *Final form of the Armenian direct transformation equations*

$$\begin{cases} dt' = \gamma_{\text{\textbackslash z}}(v)\left[\left(1+s\dfrac{v}{c}\right)dt + g\dfrac{v}{c^2}dx\right] \\ dx' = \gamma_{\text{\textbackslash z}}(v)(dx - vdt) \end{cases}$$

G_07

- *Final form of the Armenian inverse transformation equations*

$$\begin{cases} dt = \gamma_{\text{\textbackslash z}}(v')\left[\left(1+s\dfrac{v'}{c}\right)dt' + g\dfrac{v'}{c^2}dx'\right] \\ dx = \gamma_{\text{\textbackslash z}}(v')(dx' - v'dt') \end{cases}$$

G_08

Armenian Direct and Inverse Transformation Equations For Differentials of Two Dimensional Physical Quantities (φ,A)

- *Armenian direct transformation equations for physical (two-vector) quantity*

G_09

$$\begin{cases} d\varphi' = \gamma_{ł}(v)\left[\left(1+s\frac{v}{c}\right)d\varphi + g\frac{v}{c}dA\right] \\ dA' = \gamma_{ł}(v)\left(dA - \frac{v}{c}d\varphi\right) \end{cases}$$

- *Armenian inverse transformation equations for physical (two-vector) quantity*

G_10

$$\begin{cases} d\varphi = \gamma_{ł}(v')\left[\left(1+s\frac{v'}{c}\right)d\varphi' + g\frac{v'}{c}dA'\right] \\ dA = \gamma_{ł}(v')\left(dA' - \frac{v'}{c}d\varphi'\right) \end{cases}$$

First Group of Important Relations

- *From (E_21) and (F_06) we obtain Armenian transformation equations discriminant values*

$$\begin{cases} D(v) = [\gamma_{\text{ξ}}(v)]^2\left(1 + s\frac{v}{c} + g\frac{v^2}{c^2}\right) = 1 \\ D(v') = [\gamma_{\text{ξ}}(v')]^2\left(1 + s\frac{v'}{c} + g\frac{v'^2}{c^2}\right) = 1 \end{cases} \quad \text{G\_11}$$

- *First group of important relations for Armenian gamma functions*

$$\begin{cases} \gamma_{\text{ξ}}(v') = \gamma_{\text{ξ}}(v)\left(1 + s\frac{v}{c}\right) \\ \gamma_{\text{ξ}}(v) = \gamma_{\text{ξ}}(v')\left(1 + s\frac{v'}{c}\right) \\ \gamma_{\text{ξ}}(v')v' = -\gamma_{\text{ξ}}(v)v \end{cases} \quad \text{G\_12}$$

Second Group of Important Relations

- *This important relation we use for the Armenian energy formulas*

G_13

$$\gamma_{\text{չ}}(v')\left(1+\tfrac{1}{2}s\frac{v'}{c}\right) = \gamma_{\text{չ}}(v)\left(1+\tfrac{1}{2}s\frac{v}{c}\right)$$

- *This important relation we use for the Armenian momentum formulas*

G_14

$$\gamma_{\text{չ}}(v')\left(\tfrac{1}{2}s+g\frac{v'}{c}\right) + \gamma_{\text{չ}}(v)\left(\tfrac{1}{2}s+g\frac{v}{c}\right) = s\left[\gamma_{\text{չ}}(v)\left(1+\tfrac{1}{2}s\frac{v}{c}\right)\right]$$

- *This important relation we use for the Armenian full energy formulas*

G_15

$$\begin{cases} \left(\tfrac{1}{2}s+g\frac{v}{c}\right)^2 - s\left(\tfrac{1}{2}s+g\frac{v}{c}\right)\left(1+\tfrac{1}{2}s\frac{v}{c}\right) + g\left(1+\tfrac{1}{2}s\frac{v}{c}\right)^2 = \left(g-\tfrac{1}{4}s^2\right)\left(1+s\frac{v}{c}+g\frac{v^2}{c^2}\right) \\ \left(\tfrac{1}{2}s+g\frac{v'}{c}\right)^2 - s\left(\tfrac{1}{2}s+g\frac{v'}{c}\right)\left(1+\tfrac{1}{2}s\frac{v'}{c}\right) + g\left(1+\tfrac{1}{2}s\frac{v'}{c}\right)^2 = \left(g-\tfrac{1}{4}s^2\right)\left(1+s\frac{v'}{c}+g\frac{v'^2}{c^2}\right) \end{cases}$$

Chapter H

Test Particle Velocities and Formulas Related with Velocities

Definition of the Velocities From Observing Systems

- *Definition of reciprocal relative velocities of observing coordinate systems*

H_01

$$\begin{cases} v = \dfrac{dx_0}{dt} \\ v' = \dfrac{dx'_0}{dt'} \end{cases}$$

Where x_0 and x'_0 quantities are reciprocal distances between origins of the observing coordinate systems.

- *Velocities of test particle observed from two coordinate systems*

H_02

$$\begin{cases} u = \dfrac{dx}{dt} \\ u' = \dfrac{dx'}{dt'} \end{cases}$$

Time Derivatives of the Armenian Transformation Equations

- *Time derivatives of the Armenian direct transformation equations*

$$\begin{cases} \dfrac{dt'}{dt} = \gamma_{\text{չ}}(v)\left(1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}\right) \\ \dfrac{dx'}{dt} = \gamma_{\text{չ}}(v)(u - v) \end{cases}$$

H_03

- *Time derivatives of the Armenian inverse transformation equations*

$$\begin{cases} \dfrac{dt}{dt'} = \gamma_{\text{չ}}(v')\left(1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}\right) \\ \dfrac{dx}{dt'} = \gamma_{\text{չ}}(v')(u' - v') \end{cases}$$

H_04

Relations of the Time Differentials and Velocity Formulas of the Test Particle

- *Relations of the time differentials in two forms*

H_05

$$
\begin{cases}
\dfrac{dt'}{dt} = \gamma_{\text{Հ}}(v)\left(1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}\right) = \gamma_{\text{Հ}}(v')\left(1 - g\dfrac{v'u}{c^2}\right) \\[2ex]
\dfrac{dt}{dt'} = \gamma_{\text{Հ}}(v')\left(1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}\right) = \gamma_{\text{Հ}}(v)\left(1 - g\dfrac{vu'}{c^2}\right)
\end{cases}
$$

- *Moving test particle velocity formulas*

H_06

$$
\begin{cases}
\dfrac{dx'}{dt'} = u' = \dfrac{u - v}{1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}} \\[4ex]
\dfrac{dx}{dt} = u = \dfrac{u' - v'}{1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}}
\end{cases}
$$

Armenian Addition and Subtraction Formulas for Velocities and Formula for Direct Relative Velocity Expressed by Particle Velocities

- *Armenian addition and subtraction formulas for velocities expressed only by direct relative velocity*

$$\boxed{\left\{\begin{aligned} u &= u' \oplus v = \frac{\left(1 + s\frac{v}{c}\right)u' + v}{1 - g\frac{vu'}{c^2}} \\ u' &= u \ominus v = \frac{u - v}{1 + s\frac{v}{c} + g\frac{vu}{c^2}} \end{aligned}\right.}$$

H_07

- *Formula for direct relative velocity expressed by particle velocities*

$$\boxed{v = \frac{u - u'}{1 + s\frac{u'}{c} + g\frac{uu'}{c^2}}}$$

H_08

Armenian Addition and Subtraction Formulas for Velocities and Formula for Inverse Relative Velocity Expressed by Particle Velocities

- *Armenian addition and subtraction formulas for velocities expressed only by inverse relative velocity*

H_09

$$\begin{cases} u' = u \oplus v' = \dfrac{\left(1 + s\dfrac{v'}{c}\right)u + v'}{1 - g\dfrac{v'u}{c^2}} \\[2ex] u = u' \ominus v' = \dfrac{u' - v'}{1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}} \end{cases}$$

- *Formula for inverse relative velocity expressed by particle velocities*

H_10

$$v' = \frac{u' - u}{1 + s\dfrac{u}{c} + g\dfrac{uu'}{c^2}}$$

Armenian Gamma Function Formulas for the Test Particle Moving by Arbitrary Velocity

- *Armenian gamma function formula with respect to the coordinate system* K

$$\gamma_{ջ}(u) = \frac{1}{\sqrt{1 + s\frac{u}{c} + g\frac{u^2}{c^2}}}$$

H_11

- *Armenian gamma function formula with respect to the coordinate system* K'

$$\gamma_{ջ}(u') = \frac{1}{\sqrt{1 + s\frac{u'}{c} + g\frac{u'^2}{c^2}}}$$

H_12

Moving Test Particle Gamma Functions Transformations

- *First form of the gamma functions transformation formulas*

H_13

$$\begin{cases} \gamma_{չ}(u) = \gamma_{չ}(v)\gamma_{չ}(u')\left(1 - g\dfrac{vu'}{c^2}\right) \\ \gamma_{չ}(u') = \gamma_{չ}(v')\gamma_{չ}(u)\left(1 - g\dfrac{v'u}{c^2}\right) \end{cases}$$

- *Second form of the gamma functions transformation formulas*

H_14

$$\begin{cases} \gamma_{չ}(u) = \gamma_{չ}(v')\gamma_{չ}(u')\left(1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}\right) \\ \gamma_{չ}(u') = \gamma_{չ}(v)\gamma_{չ}(u)\left(1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}\right) \end{cases}$$

Few More Relations Between Armenian Gamma Functions

- *Interesting relations between Armenian gamma functions for observing systems*

$$\begin{cases} \gamma_{\text{չ}}(v)\gamma_{\text{չ}}(v') = \dfrac{1}{\left(1+s\dfrac{v}{c}+g\dfrac{vu}{c^2}\right)\left(1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^2}\right)} \\ \gamma_{\text{չ}}(v)\gamma_{\text{չ}}(v') = \dfrac{1}{\left(1-g\dfrac{vu'}{c^2}\right)\left(1-g\dfrac{v'u}{c^2}\right)} \end{cases}$$

H_15

- *Test particle Armenian gamma functions relation formulas in two forms*

$$\begin{cases} \dfrac{\gamma_{\text{չ}}(u)}{\gamma_{\text{չ}}(u')} = \gamma_{\text{չ}}(v)\left(1-g\dfrac{vu'}{c^2}\right) = \gamma_{\text{չ}}(v')\left(1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^2}\right) \\ \dfrac{\gamma_{\text{չ}}(u')}{\gamma_{\text{չ}}(u)} = \gamma_{\text{չ}}(v')\left(1-g\dfrac{v'u}{c^2}\right) = \gamma_{\text{չ}}(v)\left(1+s\dfrac{v}{c}+g\dfrac{vu}{c^2}\right) \end{cases}$$

H_16

Invariant Relation For Time Differentials

- *Invariant relation for time differentials - definition of proper time*

H_17

$$\begin{cases} \dfrac{dt}{dt'} = \dfrac{\gamma_{\xi}(u)}{\gamma_{\xi}(u')} \\[2ex] \dfrac{dt'}{dt} = \dfrac{\gamma_{\xi}(u')}{\gamma_{\xi}(u)} \end{cases} \quad \Rightarrow \quad \frac{dt}{\gamma_{\xi}(u)} = \frac{dt'}{\gamma_{\xi}(u')} = d\tau$$

- *Time differentials relations for two special cases*

H_18

$$\begin{cases} \text{If} \quad u' = 0 \quad \text{then} \quad \begin{cases} \gamma_{\xi}(u') = 1 \\ u = v \end{cases} \quad \text{therefore} \quad \dfrac{dt}{dt'} = \gamma_{\xi}(v) \\[4ex] \text{If} \quad u = 0 \quad \text{then} \quad \begin{cases} \gamma_{\xi}(u) = 1 \\ u' = v' \end{cases} \quad \text{therefore} \quad \dfrac{dt'}{dt} = \gamma_{\xi}(v') \end{cases}$$

Relations Between Direct and Inverse Relative Velocities Expressed by Test Particle Velocities

- *First group of relations*

$$\begin{cases} \gamma_{\zeta}(v) & = & \gamma_{\zeta}(u)\gamma_{\zeta}(u')\left(1 + s\dfrac{u'}{c} + g\dfrac{uu'}{c^2}\right) \\ \gamma_{\zeta}(v') & = & \gamma_{\zeta}(u)\gamma_{\zeta}(u')\left(1 + s\dfrac{u}{c} + g\dfrac{uu'}{c^2}\right) \end{cases}$$

H_19

- *Second group of relations*

$$\begin{cases} 1 + s\dfrac{v}{c} & = & \dfrac{1 + s\dfrac{u}{c} + g\dfrac{uu'}{c^2}}{1 + s\dfrac{u'}{c} + g\dfrac{uu'}{c^2}} \\ 1 + s\dfrac{v'}{c} & = & \dfrac{1 + s\dfrac{u'}{c} + g\dfrac{uu'}{c^2}}{1 + s\dfrac{u}{c} + g\dfrac{uu'}{c^2}} \end{cases}$$

H_20

Armenian Direct and Inverse Transformation Equations Expressed by Test Particle Velocities

- *Armenian direct transformation equations for test particle coordinates differentials*

H_21

$$\begin{cases} dt' = \gamma_{\text{չ}}(u)\gamma_{\text{չ}}(u')\left[\left(1 + s\dfrac{u}{c} + g\dfrac{uu'}{c^2}\right)dt + g\dfrac{u - u'}{c^2}dx\right] \\ dx' = \gamma_{\text{չ}}(u)\gamma_{\text{չ}}(u')\left[\left(1 + s\dfrac{u'}{c} + g\dfrac{uu'}{c^2}\right)dx - (u - u')dt\right] \end{cases}$$

- *Armenian inverse transformation equations for test particle coordinates differentials*

H_22

$$\begin{cases} dt = \gamma_{\text{չ}}(u)\gamma_{\text{չ}}(u')\left[\left(1 + s\dfrac{u'}{c} + g\dfrac{uu'}{c^2}\right)dt' + g\dfrac{u' - u}{c^2}dx'\right] \\ dx = \gamma_{\text{չ}}(u)\gamma_{\text{չ}}(u')\left[\left(1 + s\dfrac{u}{c} + g\dfrac{uu'}{c^2}\right)dx' - (u' - u)dt'\right] \end{cases}$$

Chapter I

Test Particle Accelerations and Formulas Related with Accelerations

Definitions of Accelerations From Observing Coordinate Systems

- *Remembering reciprocal relative accelerations between observing coordinate systems*

I_01

$$\begin{cases} a = \dfrac{dv}{dt} \\ a' = \dfrac{dv'}{dt'} \end{cases}$$

- *Test particle acceleration formulas from observing coordinate systems*

I_02

$$\begin{cases} b = \dfrac{du}{dt} \\ b' = \dfrac{du'}{dt'} \end{cases}$$

Calculation Moving Test Particle Acceleration Formulas

- *We need to use the following formulas of the test particle velocities*

$$\begin{cases} u' = \dfrac{u-v}{1+s\dfrac{v}{c}+g\dfrac{vu}{c^2}} \\[2ex] u = \dfrac{u'-v'}{1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^2}} \end{cases}$$

I_03

- *After differentiations above test particle velocity formulas, we get*

$$\begin{cases} \left(\dfrac{dt'}{dt}\right)\dfrac{du'}{dt'} = \dfrac{1}{\left(1+s\dfrac{v}{c}+g\dfrac{vu}{c^2}\right)^2}\left[\dfrac{1}{\gamma_{\xi}^2(v)}\dfrac{du}{dt}-\dfrac{1}{\gamma_{\xi}^2(u)}\dfrac{dv}{dt}\right] \\[2ex] \left(\dfrac{dt}{dt'}\right)\dfrac{du}{dt} = \dfrac{1}{\left(1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^2}\right)^2}\left[\dfrac{1}{\gamma_{\xi}^2(v')}\dfrac{du'}{dt'}-\dfrac{1}{\gamma_{\xi}^2(u')}\dfrac{dv'}{dt'}\right] \end{cases}$$

I_04

Test Particle Accelerations Transformation Formulas

- *First form of the test particle accelerations transformation formulas*

I_05

$$\begin{cases} \left(\dfrac{dt'}{dt}\right)b' = \dfrac{1}{\left(1+s\dfrac{v}{c}+g\dfrac{vu}{c^2}\right)^2}\left[\dfrac{1}{\gamma_{\xi}^2(v)}b-\dfrac{1}{\gamma_{\xi}^2(u)}a\right] \\ \left(\dfrac{dt}{dt'}\right)b = \dfrac{1}{\left(1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^2}\right)^2}\left[\dfrac{1}{\gamma_{\xi}^2(v')}b'-\dfrac{1}{\gamma_{\xi}^2(u')}a'\right] \end{cases}$$

- *Second form of the test particle accelerations transformation formulas*

I_06

$$\begin{cases} \left(\dfrac{dt'}{dt}\right)^3 b' = b-\dfrac{\gamma_{\xi}^2(v)}{\gamma_{\xi}^2(u)}a \\ \left(\dfrac{dt}{dt'}\right)^3 b = b'-\dfrac{\gamma_{\xi}^2(v')}{\gamma_{\xi}^2(u')}a' \end{cases}$$

Test Particle Accelerations Transformation Symmetric Formulas And Relations Between Reciprocal Relative Accelerations

- *Test particle accelerations transformation formulas written in symmetric form*

$$\begin{cases} \gamma_{\text{չ}}^{3}(u')b' = \gamma_{\text{չ}}^{3}(u)b - \gamma_{\text{չ}}^{2}(v)\gamma_{\text{չ}}(u)a \\ \gamma_{\text{չ}}^{3}(u)b = \gamma_{\text{չ}}^{3}(u')b' - \gamma_{\text{չ}}^{2}(v')\gamma_{\text{չ}}(u')a' \end{cases}$$

I_07

- *Adding each other above two accelerations transformation formulas, we get the relation between reciprocal relative accelerations*

$$\gamma_{\text{չ}}^{2}(v')\gamma_{\text{չ}}(u')a' + \gamma_{\text{չ}}^{2}(v)\gamma_{\text{չ}}(u)a = 0$$

I_08

Reciprocal Relative Acceleration Formulas

- *First form of the reciprocal relative acceleration formulas*

I_09

$$\begin{cases} a' = -\dfrac{1}{\gamma_{չ}(v)\left(1+s\dfrac{v}{c}\right)^{2}\left(1+s\dfrac{v}{c}+g\dfrac{vu}{c^{2}}\right)}a \\[2ex] a = -\dfrac{1}{\gamma_{չ}(v')\left(1+s\dfrac{v'}{c}\right)^{2}\left(1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^{2}}\right)}a' \end{cases}$$

- *Second form of the reciprocal relative acceleration formulas*

I_10

$$\begin{cases} \gamma_{չ}^{3}(v')a' = -\dfrac{1+s\dfrac{v}{c}}{\gamma_{չ}(v)\left(1+s\dfrac{v}{c}+g\dfrac{vu}{c^{2}}\right)}[\gamma_{չ}^{3}(v)a] \\[2ex] \gamma_{չ}^{3}(v)a = -\dfrac{1+s\dfrac{v'}{c}}{\gamma_{չ}(v')\left(1+s\dfrac{v'}{c}+g\dfrac{v'u'}{c^{2}}\right)}[\gamma_{չ}^{3}(v')a'] \end{cases}$$

Contradictions
Between Relations Observing Time Differentials and Especially in the Reciprocal Relative Acceleration Formulas

- *Formulas containing contradictions, depending on test particle velocity* u

$$\begin{cases} \left(\dfrac{dt'}{dt}\right)_u = \gamma_{\text{ɿ}}(v)\left(1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}\right) \\ (a')_u = -\dfrac{1}{\gamma_{\text{ɿ}}(v)\left(1 + s\dfrac{v}{c}\right)^2\left(1 + s\dfrac{v}{c} + g\dfrac{vu}{c^2}\right)}a \end{cases}$$

I_11

- *Formulas containing contradictions, depending on test particle velocity* u'

$$\begin{cases} \left(\dfrac{dt}{dt'}\right)_{u'} = \gamma_{\text{ɿ}}(v')\left(1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}\right) \\ (a)_{u'} = -\dfrac{1}{\gamma_{\text{ɿ}}(v')\left(1 + s\dfrac{v'}{c}\right)^2\left(1 + s\dfrac{v'}{c} + g\dfrac{v'u'}{c^2}\right)}a' \end{cases}$$

I_12

Facing With Contradictions

Contradictions illustrated by (I_11) and (I_12) are not just specific for Armenian Theory of Relativity, discussed in Volume A and Volume B, but these contradictions are already build in legacy theory of relativity as well. Unfortunately the experts in that field deliberately or unconsciously ignoring the contradictions in the theory and patching all the holes.

How it is possible, that the relations of time differentials of the observing systems must depend on arbitrary observed test particle velocities. Until now this paradox has not been harmful for us and it seems that it only has philosophical value (Volume A). But this contradiction becomes deeper when we start discussing the case of general relativity where the observing coordinate systems are moving with respect to each other with accelerations (Volume B). In this case we derived reciprocal relative acceleration formulas from which follows, for example, the inverse relative acceleration that depends not just on direct relative acceleration, but it also depends at arbitrary observed test particles velocities, which for different observed particles can have arbitrary values. We can say the same thing about the direct relative acceleration formula, which depends not just on inverse relative acceleration, but it also depends on arbitrary observed different test particles velocities.

This exposed contradiction, which was existed in the legacy theory of relativity and just now was introduced by Armenian interpretation of relativity (Volumes A and B), we can perhaps compare to the beginning of 20-th century ultraviolet catastrophe for the black body radiation problem. But in those days, theoretical physicists faced problems head on, instead of hiding from them.

It is quite logical that the reciprocal relative accelerations of the observing coordinate systems cannot be dependent on observed test particles arbitrary velocities, but that reciprocal accelerations must depend only observing coordinate systems corresponding relative velocities and relative accelerations. Therefore we need to completely revise all conceptions about how we describe relative motions in time-space and we need rewrite whole theory of relativity at large, which we will accomplish in our upcoming volumes (see I_13).

We will come out victorious from this deep crisis in theoretical physics, building powerful Armenian Theory of Relativity in one physical dimension and in three physical dimensions as well.

Conclusion From Test Particle Acceleration Formulas and Promising Approaches - Wishes Which Need to be Incarnated

- *It will be perfect if instead of (I_08), we received the following formula, which will not be dependent on the test particle velocities at all and this type of beautiful formula will solve the mentioned contradictions*

$$\boxed{\gamma_{\xi}^{3}(v')a' + \gamma_{\xi}^{3}(v)a = 0} \qquad \text{I\_13}$$

- *But to receive the formula (I_13), it is necessary that instead of the test particle accelerations symmetric formula (I_07) we have the following symmetric formula*

$$\boxed{\begin{cases} \gamma_{\xi}^{3}(u')b' = \gamma_{\xi}^{3}(u)b - \gamma_{\xi}^{3}(v)a \\ \gamma_{\xi}^{3}(u)b = \gamma_{\xi}^{3}(u')b' - \gamma_{\xi}^{3}(v')a' \end{cases}} \qquad \text{I\_14}$$

Conclusions

In this new - second volume of the visual crash course of "Armenian Theory of Relativity", which is organic sequel of the first volume, we discuss the case (Case B) where observing coordinate systems moving against each other with arbitrary acceleration. We also used the most general considerations and only a pure mathematical approach, and in so doing, we build a theory of general relativity (kinematics) and received Armenian direct and inverse transformation equations for observed test particle coordinates differentials.

Our visual book, which is also made for broad audiences of physicists, does not generalize legacy theory of general relativity, but using totally new approach and without limitations, in one dimensional physical space, building more logical and correct theory of general relativity (for now kinematics only), which has one additional new universal constant (s).

Our received Armenian direct and inverse transformation equations for moving test particle coordinates differentials we can also obtain in a very easy way from the Armenian Theory of Special Relativity (Volume A) transformation equations, by just taking test particle coordinates two infinitesimal points, where reciprocal relative velocities between observing systems are instantaneous variable velocities.

But we prefer to go hard way to show the fact that Armenian Theory of Relativity is a solid mathematical theory. In this volume we also faced contradictions and our next volumes we will solve those "contradictions".

We also advise readers to be very cautious when comparing legacy theory relativity with the Armenian Theory of Relativity, especially when instead of trying to understand the new theory, they use their whole energy trying to find “mistakes” or “paradoxes” in Armenian Theory of Relativity. Please just try to remember that legacy theories of relativity are symmetric theories, but Armenian Theory of Relativity is asymmetric theory of relativity.

Proofs in this volume are also very brief and therefore readers need to put sufficient effort to prove all providing formulas.

Our Published Articles and Books

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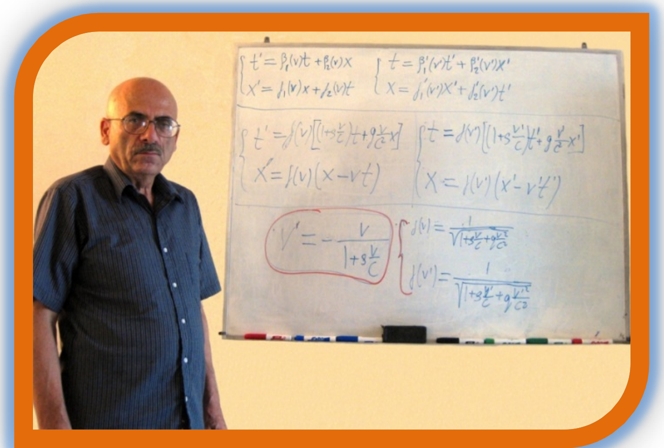
Authors Short Biographies



Robert Nazaryan, a grandson of surviving victims of the Armenian Genocide (1915 - 1921), was born on August 7, 1948 in Yerevan, the capital of Armenia. As a senior in high school he won first prize in the national mathematics Olympiad of Armenia in 1966. Then he attended the Physics department at Yerevan State University from 1966 - 1971 and received his MS in Theoretical Physics. 1971 - 1973 he attended Theological Seminary at Etchmiadzin, Armenia and received Bachelor of Theology degree. For seven years (1978 - 1984) he was imprisoned as a political prisoner in the USSR for fighting for the self-determination of Armenia. He has many ideas and unpublished articles in theoretical physics that are waiting his time to be revealed. Right now he is working to finish "Armenian Theory of Relativity in 3 Physical Dimensions".
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